

# UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. 31509  
CSAH NO. 63  
OVER THE  
MISSISSIPPI RIVER  
DISTRICT 1 - ITASCA COUNTY

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PREPARED FOR THE  
MINNESOTA DEPARTMENT OF TRANSPORTATION  
BY  
COLLINS ENGINEERS, INC.  
JOB NO. 5221 (CEI 28)

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 31509, Piers 1 through 5, were found to be in good to satisfactory condition with no defects of structural significance observed. The corrosion on the steel pipe piles has increased since the previous inspection, but still has not compromised the overall structural integrity of the piles. The channel bottom appeared to be stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

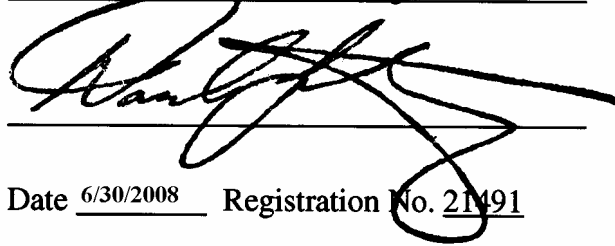
- (A) Coating failure, corrosion, rust nodules, and up to 1/8 inch deep pitting (maximum with 1/32 inch deep typical pitting) were observed on approximately 80 to 100 percent of the steel pile surfaces from the waterline to the channel bottom.
- (B) Minor amounts of timber drift were found on the channel bottom around Piers 2 and 4.

RECOMMENDATIONS:

- (A) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

A large, stylized handwritten signature in black ink, appearing to read 'Daniel G. Stromberg', is written over two horizontal lines.

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

A large, stylized handwritten signature in black ink, appearing to read 'Daniel G. Stromberg', is written over two horizontal lines.

Daniel G. Stromberg  
Registered Professional  
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 31509

Feature Crossed: Mississippi River

Feature Carried: CSAH No. 63

Location: District 1 - Itasca County

Bridge Description: The superstructure consists of six spans of prestressed concrete beams. The superstructure is supported by two abutments founded on piles and five steel shell pile bent piers.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 28, 2007

Weather Conditions: Cloudy, 68°F

Underwater Visibility: 5.0 feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 through 5.

General Shape: Piers 1, 2, 4, and 5 are made up of a single line of eight steel shell piles supporting a concrete cap. Pier 3 consists of two lines of five steel shell piles each under the cap.

Maximum Water Depth at Substructure Inspected: Approximately 22.5 feet

4. WATERLINE DATUM

Water Level Reference: The top of the cap at the east end of Pier 2.

Water Surface: The waterline was approximately 10.3 feet below reference.  
Water Elevation = 1268.2.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code 0/96

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

       Yes   X   No



Photograph 1. Overall View of the Structure, Looking Northwest.



Photograph 2. View of Pier 1, Looking North.





Photograph 3. View of Pier 2, Looking Southeast.



Photograph 4. View of Pier 3, Looking Southeast.



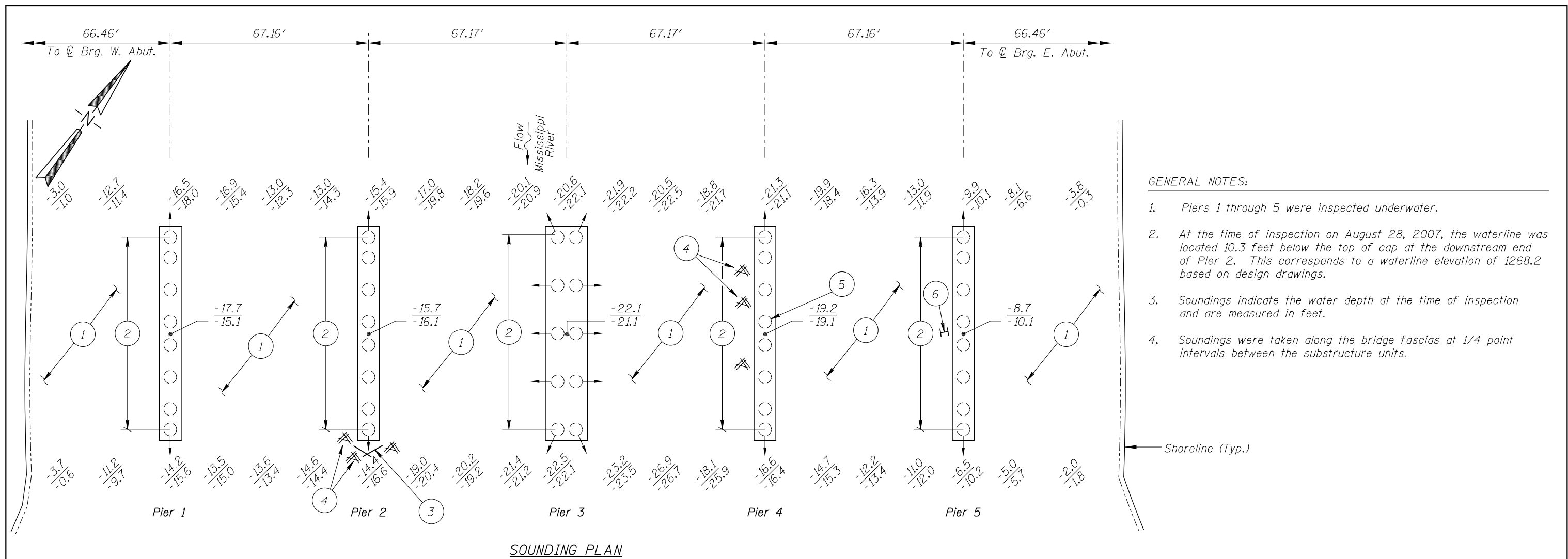


Photograph 5. View of Pier 4, Looking Southeast.



Photograph 6. View of Pier 5, Looking Southeast.





**SOUNDING PLAN**

**INSPECTION NOTES:**

- Channel bottom consists of soft silty sand with gravel and cobbles, with up to 6 inches of probe rod penetration.
- Coating failure, corrosion, and rust nodules, were observed from 6 inches above the waterline to the channel bottom on approximately 80 to 100 percent of the surface area of all piles. Typical pitting penetrations of the rust nodules were 1/32 inch, with infrequent instances of 1/16 inch and 1/8 inch penetrations observed on the steel shell piles.
- Large steel plate debris.
- Timber drift consisting of 1 foot diameter and smaller logs observed at the mudline.
- 3/4 inch diameter steel cables were observed to be wrapped around the pile.
- A steel H-pile was sticking 8 feet out of the channel bottom and angled toward the downstream.

**Note:**

All soundings based on 2007 waterline location.

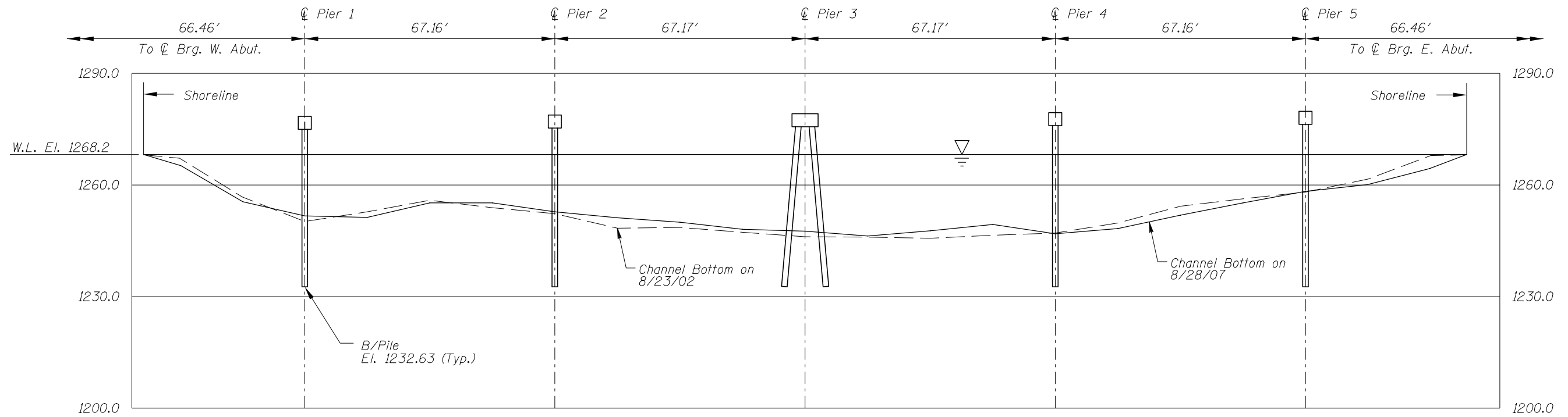
**Legend**

- 1.7 Sounding Depth (8/28/07)
- 4.4 Sounding Depth (8/23/02)
- ( ) Steel Pile (under cap)
- ( ) → Steel Batter Pile (cap under)
- Timber Debris

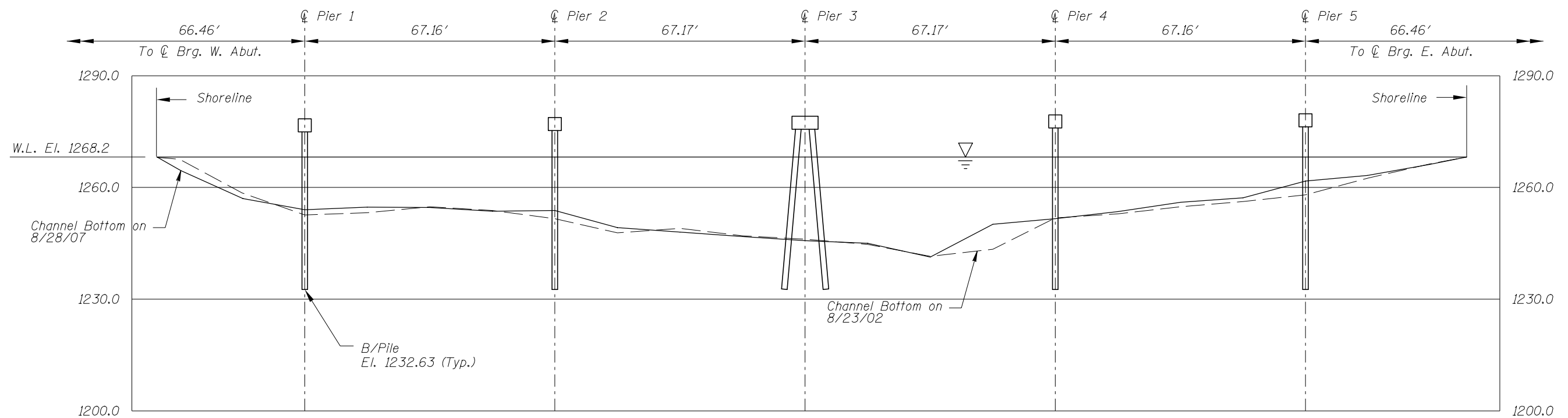
**TYPICAL END VIEW OF PIERS 1,2,4 & 5**

**TYPICAL END VIEW OF PIER 3**

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. 31509 OVER THE MISSISSIPPI RIVER DISTRICT I, ITASCA COUNTY		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: LJ	<b>COLLINS ENGINEERS</b> 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: AUG, 2007
Checked By: VR		Scale: NTS
Code: 52210028		Figure No.: I



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

**MINNESOTA  
DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION**

STRUCTURE NO. 31509  
OVER THE MISSISSIPPI RIVER  
DISTRICT I, ITASCA COUNTY  
**UPSTREAM AND DOWNSTREAM  
FASCIA PROFILES**

Drawn By: LJ	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: AUG. 2007
Checked By: VR		Scale: 1"=30'
Code: 52210028		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES  
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 28, 2007

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.

BRIDGE NO: 31509 WEATHER: Cloudy, 68° F

WATERWAY CROSSED: Mississippi River

DIVING OPERATION:   X   SCUBA        SURFACE SUPPLIED AIR  
       OTHER       

PERSONNEL: John J. Loftus, Valerie Roustan

EQUIPMENT: SCUBA, U/W Light, Scraper, Lead Line, Probe Rod, Camera

TIME IN WATER: 8:30 a.m.

TIME OUT OF WATER: 9:00 a.m.

WATERWAY DATA: VELOCITY Negligible/None

VISIBILITY 5.0 feet

DEPTH 22.5 feet maximum at Pier 3

ELEMENTS INSPECTED: Piers 1 through 5

REMARKS: Overall, the submerged steel of the piles was in good to satisfactory condition with 80% to 100% coating failure and nodular corrosion mostly between the waterline and the channel bottom. The corrosion thus far has minimal loss of section associated with it, although there was pitting with typical penetrations of 1/32 inch. In a few scattered instances, some of the pitting was 1/16 to 1/8 inch deep. At Piers 2 and 4 there were minor amounts of timber drift and/or steel debris on the channel bottom in and around the piles.

FURTHER ACTION NEEDED:        YES   X   NO

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.



MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 31509  
INSPECTORS Collins Engineers, Inc.  
ON-SITE TEAM LEADER Daniel G. Stromberg, P.E., S.E.  
WATERWAY CROSSED Mississippi River

INSPECTION DATE August 28, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE						CHANNEL					GENERAL					
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (BRACING)	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	17.7'	6	N	N	9	N	6	8	8	8	N	8	N	6	N	6	N	N
	Pier 2	15.7'	6	N	N	9	N	6	8	N	N	7	7	N	6	N	6	N	N
	Pier 3	22.5'	6	N	N	9	N	6	8	N	N	N	8	N	6	N	6	N	N
	Pier 4	21.3'	6	N	N	9	N	6	8	N	N	7	7	N	6	N	6	N	N
	Pier 5	9.9'	6	N	N	9	N	6	8	8	8	8	8	N	6	N	6	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the submerged steel of the piles was in good to satisfactory condition with 80% to 100% coating failure and nodular corrosion mostly between the waterline and the channel bottom. The corrosion thus far has minimal loss of section associated with it, although there was pitting with typical penetrations of 1/32 inch. In a few scattered instances, some of the pitting was 1/16 to 1/8 inch deep. At Piers 2 and 4 there were minor amounts of timber drift and/or steel debris on the channel bottom in and around the piles.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.  
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.